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Karpinski's *Robert of Chester's Latin Translation of the Algebra of al Khwarismi* (New York, 1915) 218-219.

Heft 12, in December, 1919, completed the jubilee volume of *Zeitschrift für mathematischen und naturwissenschaftlichen Unterricht aller Schulgattungen*, founded by J. C. V. Hoffmann (1825-1905) in 1869.

In 1911 Teubner published the first two volumes of the great edition of Leonard Euler's *Opera Omnia*, now being prepared under the auspices of the Swiss Mathematical Society, a section of the Society of Swiss Naturalists. It was planned that the works should contain about 70 volumes and be issued in three series: series I—opera mathematica, 28 volumes; series II—opera mechanica et astronomica, 27 volumes; series III—opera physica, miscellanea, epistolae, 15 volumes.

Thirteen of these volumes have been published: the two volumes of *Dioptrica* in series III; the two volumes of *Mechanica sive motus scientia analytice exposita* in series II; and the following nine volumes in series I—*Vollständige Anleitung zur Algebra*; the first of four volumes of *Commentationes arithmeticae*; the four volumes of *Institutiones calculi differentialis* and *Institutiones calculi integralis*; the first of the two volumes of *Commentationes analyticae* (integrals); and the two volumes of *Commentationes analyticae* (elliptic integrals).

In E. C. Moore's *What the War Teaches About Education and other Papers and Addresses* (New York, Macmillan, 1919) Chapter 6, pages 95-119, entitled "Does the study of mathematics train the mind specifically or universally?," was an address before the Association of Teachers of Mathematics in New England, April, 1917; chapter 7, pages 120-128, entitled "Mathematics and formal discipline again," was reprinted from *School and Society*, December 29, 1917, and is a reply to "The inadequacy of arguments against disciplinary values" by C. N. Moore; chapter 8, pages 129-151, entitled "Does the study of mathematics train the mind specifically or universally? A reply to a reply," is reprinted from *School and Society*, April 27, 1918, in reply to "Does the study of mathematics train the mind specifically or universally? A reply" by R. E. Moritz.

ARTICLES IN CURRENT PERIODICALS.

ANNAES SCIENTIFICAS DA ACADEMIA POLYTECHNICA DO PORTO, volume 13, 1919, no. 2: "Pedro Nunes e os infinitamente pequenos" by R. Guimaraes, 65-71—No. 3: "Sur les surfaces réglées" by C. Servais, 129-151; "Sur l'octaèdre à faces triangulaires" by J. Neuberg, 161-171.

BULLETIN DE LA SOCIÉTÉ MATHÉMATIQUE DE FRANCE, volume 47, nos. 1-2, 1919: "Les fondements de la théorie des fonctions elliptiques" by H. Hancock, 37-42.

BULLETIN DES SCIENCES MATHÉMATIQUES, volume 54, August, 1919: Review by H. Deltheil of G. Castelnuovo's *Calcolo delle Probabilità* (Milano-Roma-Napoli, 1919), 165-174; Review by E. Cartan of G. Bouligand's *Cours de géométrie analytique* (Paris, 1919), 175-178; "Sur les intégrales de Fresnel" by A. Bloch, 179-180.

HARVARD GRADUATES MAGAZINE, volume 28, March 1920: "An American liaison officer in Paris" by J. L. Coolidge, 394-408.

MATHEMATICAL GAZETTE, volume 9, no. 143, December, 1919: "Report of the Mathematical Association committee on the teaching of mathematics in public and secondary schools,"

393-421; "Gleanings far and near," 421; Note on "The series for $\sin x$ and $\cos x$ " by F. Jackson, 422-424; "Books received, contents of journals, etc.," i-iv; "The teachers' library," i-viii [section III (history, about 60 titles), section IV (biography, about 40 titles), section V (philosophy, about 35 titles)]—Volume 10, no. 144, January, 1920: "The relations of geography and mathematics in a well-equipped secondary school" by J. Fairgrieve, 1-2; "The graphical treatment of differential equations" (continued) by S. Brodetsky, 3-8; "Gleanings far and near," 8, 13; "Ratio and proportion" by D. K. Picken, 9-13; "Note on Napier's logarithms" by W. R. Bower, 14-16.

MESSENGER OF MATHEMATICS, volume 49, no. 1, May, 1919: "Factorisation of N & $N' = (x^n \mp y^n) \div (x \mp y)$, &c. [when $x - y = 1$]," by A. Cunningham, 1-16—June: [same], 17-32.

NATURE, volume 104, December 25, 1919: "The reform of the calendar" by H. C. Plummer, 415-416 [First sentence: "Those who have concerned themselves with the question of a reformed calendar will find much interesting matter in a report published by a committee which was appointed early in the year by the Paris Société d'Encouragement pour l'Industrie nationale"—January 1, 1920: "Deflection of light during a solar eclipse" by A. Anderson, 436; "Einstein's theory and a map analogue" by E. Cunningham, 437—January 8: "The neglected study of probabilities" by G. S. Bryan, 464-465 [Review of Castelnuovo's book *Calcolo delle Probabilità*]; (Milano-Roma-Napoli, 1919).

Quotation: ["Among the sins of omission for which mathematicians and teachers of mathematics might be charged, there is probably none which has so vitally affected our national welfare as the neglect of the study of probabilities. Into every event of ordinary life considerations of probability enter in a greater or less degree, and for this reason every boy or girl who has learnt to use vulgar fractions ought to be taught to apply them to simple games of chance, and in this way to illustrate the rules for fractional addition, multiplication, and so forth. In default of this knowledge, millions of pounds are spent on postal orders in response to attractive offers of hundred-pound prizes the expectation value of which is not one-tenth of the price paid. Yet it was only recently that the Central Welsh Board excluded probabilities from an examination syllabus in algebra which was simply loaded up with questions on collections of letters and symbols that could convey no meaning to the victims of the examination system.

"Other applications are to such problems as life assurance and statistics . . . Prof. Castelnuovo's treatise strikes the reviewer as just the kind of book of which it would be worth while to publish an English translation. . . . In our universities a great deal of waste energy in the departments of pure mathematics could also be utilized by turning out graduates with a knowledge of probabilities and statistics which would filter down through the teachers to the elementary schools and thus to the citizens of the future."] "Deflection of light during a solar eclipse" by A. Schuster, 468; "Relativity and radio-activity" by J. Joly, 468; "Retirement of Sir Oliver Lodge," 483—February 26: "A mathematician's miscellany," review by N. R. C. of M. Lecat's *Pensées sur la science, la guerre et sur des sujets très variés* (Bruxelles, 1919), 689-690; "Gravitational deflection of high-speed particles" by Leigh Page, 692-693—Volume 105, March 4: "The Einstein deflection of light" by A. D. Crommelin, 23-24—March 11: "Mathematical cosmogony" by H. C. Plummer, 31-32 [Review of J. H. Jean's *Problems of cosmogony and stellar dynamics*, (Cambridge, 1919)]; "Gravitational deflection of high-speed particles" by A. S. Eddington, 37; "Gravitational shift of spectral lines" by H. Jeffreys, 37-38; "The mariner's compass," 44; "The gyrostatic compass" by S. G. Brown, 44-48.

NOUVELLES ANNALES DE MATHÉMATIQUES, volume 78, August, 1919: "Théorème général sur les équations algébriques" by M. Petrovitch, 281-284; "Sur l'identité de Begout" by B. Gambier, 284-297; "Concours d'agrégation de 1914," 297-311; "Solutions de questions proposés," 311-320—September: "Démonstration du théorème fondamental de la théorie des équations algébriques" by L. Pomey, 321-324; "Sur le rapport anharmonique" by M. Auric, 325-329; "Sur les courbes à axe orthoptique et les courbes de direction" by M. d'Ocagne, 329-338; "Remarques géométriques sur une question de concours à l'Ecole Polytechnique en 1919" by P. du Plessis, 338-342; "Agrégation de l'enseignement secondaire des jeunes filles: concours de 1919.—Problème de géométrie et de géométrie analytique," 342-354; "Sur la détermination du rayon de courbure en coordonnées polaires" by M. d'Ocagne, 354-356; "L'enseignement mathématiques à l'université de Strasbourg," 356-360—October: "Sur le complexe de Painvin," by A. Myller, 361-365; "Quelques applications d'une remarque de M. d'Ocagne" by M. F. Egan, 365-368; "Quelques applications des formules vectorielles (L)" (continued) by—Levengle, 368-373; "Trois

démonstrations des théorèmes de Fermat et de Wilson" by L. Pomey; 373-380 ["Si p est un nombre premier et a un entier non divisible par lui, p divise $a^{p-1} - 1$ (Fermat) et $(p-1)! + 1$ (Wilson)"]; "Enveloppe des plans des faces des hexaèdres dont les diagonales sont portées par des droites données" by G. Fontené, 380-391; "Observations sur les triangles rectangles en nombres entiers et les suites de Fibonacci" by C. A. Laisant, 391-397; Review by R. Bricard of G. Bouligand's *Cours de géométrie analytique* (Paris, 1919), 397-399; "Questions," 399-400.

PHILOSOPHICAL MAGAZINE, London, sixth series, volume 38, December, 1919: "The kinematics of the eye" by H. Lamb, 685-695 ["This subject should be of interest to mathematicians, for it is almost the only field where the theory of finite rotations, so elegant geometrically, finds a practical application.

"The theory of the movements of the eye was investigated very completely by Helmholtz,¹ and forms a considerable chapter of his *Physiologische Optik*.² The mathematical part of the exposition is rather elaborate, and has I think somewhat obscured the essential simplicity of the matter. There is a decided gain in this respect, as I wish to show, if we adopt a purely geometrical treatment, based mainly on theorems of Donkin and Hamilton, which were indeed anterior in date to Helmholtz's work but could hardly have been known to him"]; "On some aspects of the theory of probability" by Dorothy Wrinch and H. Jeffreys, 715-731 ["Summary: It is shown that the attempt to give a definition of probability in terms of frequency is unsuccessful. Laplace's definition, apparently in these terms, really involves implicitly the concept of probability and is therefore circular in character. Veun's definition in terms of the limit of a series is unsatisfactory because there is no reason to believe that his series do in fact usually tend to a limit; it is shown that there are many cases where they do not; and as his process is incapable of being carried out, the existence of such a limit can in any case only be known *a priori* if at all, so that his method offers no advantage over that of regarding probability as an entity known to exist independently of definition, intelligible without such definition, and perhaps undefinable.

"A set of axioms on which a mathematical theory of probability can be based is then given, which seems to offer certain advantages over the current ones. In particular it is capable of covering cases where the principle of sufficient reason cannot be applied to assess probability. It is also shown that a complete theory of probability must allow for the use of infinitesimals.

"A discussion of sampling induction is given, in which it is shown that when the sample is large enough the prior probabilities of different constitutions of the whole do not usually affect appreciably the probabilities inferred after the samples have been taken. Also the range within which the fractional constitution is as likely as not to lie includes the fractional constitution of the sample, and its extent is inversely proportional to the number of the sample itself, whatever be the number of the whole."—January, 1920: "Note on the construction of a parabolic trajectory and a property of the parabola used by Archimedes" by W. B. Morton and T. C. Tobin, 157-160. —February: "The recent eclipse results and Stokes-Planck's aether" by L. Silberstein, 161-170; "Note on the possible structure for the aether" by O. J. Lodge, 170-174. —March: "Parametric solutions for a fundamental equation in the general theory of relativity, with a note on similar equations in dynamics" by E. T. Bell, 285-288; "On the measurement of time—a rejoinder to Dr. N. Campbell" by L. Silberstein, 366-372; Review of J. H. Jeans's *Problems of Cosmogony and Stellar Dynamics* (Cambridge, 1919), 377-378; Review of L. C. Karpinski, H. Y. Benedict and J. W. Calhoun's *Unified Mathematics* (Boston, 1918), 380-381 [Last paragraph: "The whole book is very elegant and stimulating, and carries Perry's pioneering ideas to a high stage of development and pitch of perfection"]; Review of H. Lamb's *Elementary Course of Infinitesimal Calculus* (Revised edition, Cambridge, 1919), 381-383.

PROCEEDINGS OF THE EDINBURGH MATHEMATICAL SOCIETY, volume 37 (session 1918-19), issued November, 1919: "The Stirling numbers and polynomials" by C. Tweedie, 2-25; "Note on the complete Jacobian elliptic integrals" by F. Bowman, 26-32; "A theorem of Sonine in Bessel functions, with two extensions to spherical harmonics" by J. Dougall, 33-47; "On the stereometric generation of the De Jonquières transformation" by J. F. Tinto, 48-58; "The co-symmedian system of tetrahedra inscribed in a sphere" by W. L. Marr, 59-64; "Determinantal systems of apolar triads in a conic" by W. L. Marr, 65-68; "Determinantal systems of apolar triads in the twisted cubic" by W. L. Marr, 69-75; "Approximations to the length of an arc" by D. M. Y. Sommerville, 76-79; "Relations between the integrals of the hypergeometric equa-

¹ "Ueber die normalen Bewegung des menschlichen Auges" (1863), reprinted in *Wissenschaftliche Abhandlungen*, vol. 2, p. 360.

² First edition, 1866; second edition, 1896.

tion" by T. M. MacRobert, 80-84; "Theorems connected with the differentiation of a circulant" by W. H. Metzler, 85-96; "List of Members, 1918-19" 97-104.

PROCEEDINGS OF THE ROYAL SOCIETY, London, volume 97, no. A681, March 1, 1920: "Discussion on the theory of relativity" [on February 5, 1920] by J. H. Jeans, A. S. Eddington, F. W. Dyson, A. Fowler, E. Cunningham, H. F. Newall, and L. Silberstein, 66-79.

REVISTA MATEMÁTICA HISPANO-AMERICANA, volume 1, nos. 8-9, October-November, 1919: "Daniel Augusto da Silva, su vida y su obra científica" by F. Gomes Teixeira, 237-243; "Puntos notables del triángulo" by P. M. González Quijano, 244-251; "Algunas nociones de análisis situs" by O. Fernández Baños, 252-258; "La sucesión de Fibonacci" (third article) by F. Vera, 259-263; Problems and solutions, 264-269; "Crónica," "Notas necrológicas," "Revista de revistas," "Bibliografía," "Glosario matemático," 270-292; "Volumen del prisma toide" by L. Catalá, 293-296.

SCHOOL REVIEW, Chicago, volume 28, no. 1, January, 1920: "A failure class in algebra" by O. A. Wood, 41-49.

SCHOOL AND SOCIETY, volume 10, December 27, 1919: "The work of the national committee on mathematical requirements," 765-766; "A queer mathematical conjecture" by G. A. Miller, 773—Volume 11, January 24, 1920: "The work of the national committee on mathematical requirements" by J. W. Y[oung], 110-111.

SCHOOL SCIENCE AND MATHEMATICS, volume 19, no. 9, December, 1919: "What is practical mathematics?" by D. H. Moskowitz, 827-829; "Marginal notes on Cajori's History of Mathematics" by G. A. Miller, 830-835; "Some mathematical howlers," 835; Problem department, 836-840; "The socialized recitation in mathematics" by F. E. Buss, 844-848; Book reviews, 862-868—Volume 20, no. 1, January, 1920: "A few live projects in high school mathematics" by F. M. Rich, 34-45; "Applied mathematics for high schools" by E. H. Barker, 46-51; "Determination of the Brocard points" by J. C. Camplain, 51; Problem department, 86-90; "Notes and news regarding the work of the national committee on mathematical requirements," 92.—February: "The relation of vocational guidance to our teaching of science and mathematics" by Anna Y. Reed, 105-113; "Correlation of mathematical subjects" by E. R. Brestich, 125-134; "Weighting data" by J. P. Ballantine, 140-141; "The differential pulley or chain hoist" by W. F. Roecker, 142-143; Problems and solutions, 174-176.

SCIENCE, new series, volume 51, January 2, 1920: "Time, space and gravitation" by A. Einstein, 8-10 [Quotation: "Thus the new theory of gravitation diverges widely from that of Newton with respect to its basal principle. But in practical application the two agree so closely that it has been difficult to find cases in which the actual differences could be subjected to observation. . . . No one must think that Newton's great creation can be overthrown in any real sense by this or by any other theory. His clear and wide ideas will for ever retain their significance as the foundation on which our modern conceptions of physics have been built."]—January 9: "Weight of a body moving along equator" by E. V. Huntington, 45-46 ["To the Editor of *Science*: A prominent engineer, Dr. Carl Hering, recently proposed to me the following question: 'Does a body in motion along the earth's equator weightless (or more) than the same body at rest?' Since this question, in some form or other, has come up several times in recent discussions, the following solution, although entirely elementary, may be not without interest. . . . There are two speeds [of a train], one westward of about 18,700 miles per hour, and one eastward of about 16,700 miles per hour, at which the 'weight' of the body as measured by an observer on the train (that is, the tension in the supporting string . . .) would be zero."]—January 16: "Recent advances in dynamics" by G. D. Birkhoff, 51-55 [address of the vice-president and chairman of Section A, Mathematics and Astronomy, of the American Association for the Advancement of Science, St. Louis, December, 1919]—January 23: "Concerning application of the probable error in cases of extremely asymmetrical frequency curves" by E. L. Michael, 89-91; "The American Mathematical Society" by F. N. Cole, 91-92—February 6: "Gravity and aerostatic pressure on fast ships and air-planes," by A. McAdie, 144-145—February 13: "Further history of the calculus" by A. S. Hathaway, 166-167—February 20: "The conference at Cleveland on the history of science" by L. Thorndike, 193-194—February 27: "A proposed method for carrying triangulation across wide gaps" by H. L. Cooke and H. N. Russell, 211-213; "Two new base maps of the United States," 213-214—March 5: "Some aspects of physics in war and peace" by G. F. Hull, 221-223 [Address of the vice-president and chairman of Section B, Physics, American Association for the Advancement of Science, St. Louis, December, 1919]; "Mathematics at the University of Stras-

bourg" by E. B. Wilson, 243—March 12: "Einstein's law of gravitation" by J. S. Ames, 253–261 [Presidential address delivered at the St. Louis meeting of the Physical Society, December 30, 1919]; "An odd problem in mechanics" by W. D. Lambert, 271–272 [First paragraph: "The following statements are intended to throw light on the questions raised by Dr. Hering in his letter entitled 'An odd problem in mechanics' in *Science* for January, 9, 1920"]—March 26: "Modern interpretation of differentials" by E. V. Huntington, 320–321 ["Without attempting to discuss the historical questions involved, I wish to point out that the theory of 'differentials' given by Professor A. S. Hathaway in *Science* for February 13, would prove highly misleading to the modern student"]; "Weight and centripetal acceleration" by B. L. Newkirk, 321 [First sentence: "Mr. Carl Hering's suggestion for a new form of dynamic compass ought to be challenged before some one organizes a company to work the idea out on a commercial basis."]

SCIENCE PROGRESS, volume 14, January, 1920: "Recent advances in pure mathematics" by Dorothy Wrinch, 361–369; "Evolution and irreversibility" by A. J. Lotka, 406–417; "Philip Edward Bertrand Jourdain," 448–451; Reviews by Dorothy Wrinch of L. E. Dickson's *History of the Theory of Numbers: Vol. I, Divisibility and Primality* (Washington, 1919) and of C. E. Cullis's *Matrices and Determinoids*, Vol. II (Cambridge, 1918), and by P. E. B. Jourdain of J. Milne's *The Analytical Geometry of the Straight Line and the Circle* (London, 1919), 497–499.

TECHNOLOGY REVIEW, Cambridge, Mass., volume 22, no. 1, January, 1920: [Various tributes to Richard Cockburn Maclaurin, 1870–1920, portrait frontispiece], 13–49.

TÔHOKU MATHEMATICAL JOURNAL, volume 16, nos. 3–4, November, 1919: "Flat-sphere geometry," (third paper) by J. Eiesland, 184–235; "On a certain class of geometrical figures" by K. Yoneyama, 236–263; "On the relations between the roots of certain two transcendental functions" by Y. Okada, 264–269; "On the theory of Stäckel curvature" by K. Ogura, 270–290; "On the convergence-abscissa of a certain definite integral" by K. Kurosu, 291–298; "On the *wan-sanists* of the Sendai, Ichnoseki, Morioka, and Hirosaki *hans*" [in Japanese] by T. Hayashi, 299–333; New Books, Contents of Periodicals, Miscellaneous Notes, 334–348.

TRANSACTIONS OF THE CAMBRIDGE PHILOSOPHICAL SOCIETY, volume 22, no. 15, October, 1919: "Asymptotic satellites near the equilateral-triangle equilibrium points in the problem of three bodies" by D. Buchanan, 309–340.

UNIVERSITY OF CALIFORNIA PUBLICATIONS IN MATHEMATICS, volume 1, no. 8, February 18, 1920: "A list of Oughtred's mathematical symbols with historical notes" by F. Cajori, 171–186—No. 9, February 17: "On the history of Gunter's scale and the slide rule during the seventeenth century" by F. Cajori, 187–209—No. 10, February 17: "On a birational transformation connected with a pencil of cubics" by A. R. Williams, 211–222—No. 11, February 17: "Classification of involutory cubic space transformations" by F. R. Morris, 223–240.

UNIVERSITY OF TEXAS BULLETIN, no. 1905, January 20, 1919: *Some dangers in establishing a pension system and the proper precautions* by E. L. Dodd, 26 pp.

WASHINGTON UNIVERSITY STUDIES, scientific series, volume 7, no. 2, January, 1920: "Notes on the geometry of the characteristic curves of the synchronous motor" by A. S. Langford, 47–57; "Geometric description of the halo on the dome of the St. Louis cathedral" by W. H. Roever, 59–65 [An analytic derivation of the form of this halo was given by the author in this MONTHLY, December, 1913, volume 20, pp. 299–303].

YALE REVIEW, volume 9, no. 3, April, 1920: "Einstein's theory of gravitation" by L. Page, 570–585.

ZEITSCHRIFT FÜR MATHEMATISCHEN UND NATURWISSENSCHAFTLICHEN UNTERRICHT, volume 50, 1919, nos. 6–7: "Die Interpolation im mathematischen Unterricht" by G. Wolff, 201–210; "Geduldspiele" by B. Kerst, 211–212; "Konstruktion des Schussnetzes für die Artillerie" by A. Krebs, 213–217; "Graphische Lösung der Gleichung $x^3 + ax + b = 0$ " by O. Dörge, 217–219; "Über die Verknüpfung des Pothenotschen Problems mit einigen anderen" by F. Redl, 219–222; "Das Buchsieb" by Friese, 223–225; "Zeichnerische Lösung astronomischer Aufgaben" by W. Misar, 225–227; "Das Minimum der Ablenkung" by M. Brües, 227–228—Nos. 8–9: "Der Einfluss der Kriegs erfahrungen auf den mathematisch-physikalischen Unterricht der höheren Schulen" by W. Lietzmann, 249–267; "Ueber zwei Fragen, die mit dem Problem der Referenz-flächen des Himmels und der Gestirne zusammenhängen" by A. Müller, 267–271—No. 10: "Rudolf Sturm zum Gedächtnis" (with portrait) by W. Lorey, 289–293; "Ein Beitrag zur schulgemässen Behandlung der Trägheits-momente" by E. Rehfeld, 294–301; "Zum Satz von Busche" by R. Mehmke, 301–305; "Modell zur Anwendung der Peripheriewinkelsätze" by A. Finzel, 305–307.